

NATIONAL BIOLOGICAL SERVICE / NATIONAL PARK SERVICE
VEGETATION INVENTORY MAPPING PROGRAM
TUZIGGOT NATIONAL MONUMENT, ARIZONA
PHOTO SIGNATURE KEY

TAXA	STATURE	PHOTO SIGNATURE (9-95) (1:6720 CIR)	LANDFORM CONTEXT	HEIGHT	OCCURENCE	ASSOCIATED TAXA	ALLIANCE/COMMUNITY	SPECIAL CONSIDERATIONS
<i>Acacia gregii</i>	Shrub	COLOR: Red-Orange CROWN SIZE: Small CROWN SHAPE: Irregular TEXTURE: Coarse irregular	Ridges and flats of upland desert areas.	1-3m	Common	<i>Prosopis velutina</i> <i>Atriplex canescens</i> <i>Krameria parvifolia</i>	<i>Prosopis velutina</i> / <i>Gutierrezia sarothrae</i> <i>Atriplex canescens</i> / <i>Muhlenbergia porteri</i> <i>Aristida purpurea</i> / <i>Krameria parvifolia</i>	Typically found in association with <i>Prosopis velutina</i> (except in the <i>Prosopis velutina</i> bosque).
Aquatic vegetation	Herbaceous	COLOR: Bright pink to Bright red CROWN SIZE: N/A CROWN SHAPE: N/A TEXTURE: Smooth	Open water	N/A	Rare	<i>Typha angustifolia</i> <i>Scirpus validus</i>	<i>Typha angustifolia</i>	Usually found in open water within stands of <i>Typha angustifolia</i> .
<i>Aristida purpurea</i>	Shrub	Photo signature not conclusive	Uplands	< .5m	Abundant	<i>Larrea tridentata</i> <i>Canotia holocantha</i> <i>Prosopis velutina</i> <i>Aristida purpurea</i> <i>Krameria parvifolia</i> <i>Gutierrezia sarothrae</i>	<i>Larrea tridentata</i> / <i>Aristida purpurea</i> <i>Canotia olocantha</i> / <i>Aristida purpurea</i> <i>Prosopis velutina</i> / <i>Gutierrezia sarothrae</i> <i>Aristida purpurea</i> / <i>Krameria parvifolia</i> <i>Juniperus erythrocarpa</i> / <i>Canotia holocantha</i>	Associated with most upland communities; photo signature is similar to other dry graminoids and small shrubs forming bunch patterns; occurs on the bluffs and mesas as a typical sparse desert grassland; forms an understory to taller shrubs.
<i>Atriplex canescens</i>	Shrub	COLOR: Pink CROWN SIZE: Small CROWN SHAPE: Round TEXTURE: Mottled	Xeric slopes on exposures of well- drained alkaline soils.	.5-2m	Common	<i>Prosopis velutina</i> Parthenium incanum Muhlenbergia porteri	<i>Atriplex canescens</i> / <i>Muhlenbergia porteri</i>	Occurs on the north and south facing slopes surrounding the ruins.

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<i>Baccharis salicifolia</i>	Shrub	Photo signature not conclusive	North of Verde river on remnant riverine flat.	1-2m	Uncommon	<i>Salsola kali</i> <i>Solanum douglassi</i> <i>Prosopis velutina</i>	<i>Prosopis velutina</i> / <i>Hordeum jubatum</i> <i>Populus fremontii</i> / <i>Hordeum jubatum</i>	Photo signature is indistinct - only identified from on-site field verification information.
<i>Canotia holocantha</i>	Shrub	COLOR: Brown CROWN SIZE: Medium CROWN SHAPE: Narrow, irregular TEXTURE: Slightly mottled	Gypsum soils - upland bluffs and mesas.	1-4m	Common	<i>Juniperus erythrocarpa</i> <i>Larrea divartica</i> <i>Aristida purpurea</i> <i>Krameria parvifolia</i>	<i>Canotia holocantha</i> / <i>Aristida purpurea</i> <i>Juniperus erythrocarpa</i> / <i>Canotia holocantha</i> <i>Larrea divartica</i> / <i>Aristida purpurea</i>	Common near top of bluffs east of the marsh where it associates with <i>Juniperus erythrocarpa</i> and the mesas where intermixes with <i>Aristida purpurea</i> and <i>Larrea divaricata</i> .
<i>Celtis reticulata</i>	Tree / Shrub	COLOR: Red-orange CROWN SIZE: Medium CROWN SHAPE: Rounded TEXTURE: Smooth	Toeslopes adjacent to steep bluffs in close proximity to the marsh or major canyons.	5-10m	Common	<i>Prosopis velutina</i> <i>Quercus turbinella</i> <i>Mahonia trifoliata</i>	<i>Prosopis velutina</i> / <i>Celtis reticulata</i> <i>Celtis reticulata</i> / <i>Quercus turbinella</i>	Photo signature cannot be differentiated from <i>Prosopis velutina</i> or <i>Quercus turbinella</i> - mapped from on-site field verification information.
<i>Chilopsis linearis</i>	Shrub	COLOR: Brown-Orange CROWN SIZE: Medium CROWN SHAPE: Narrow TEXTURE: Coarse-irregular	Adjacent to river channels on bars and flats, remnant river flats.	2-5m	Uncommon	<i>Salsola kali</i>	<i>Chilopsis linearis</i>	Significant stand along the southern bank of the Verde river.
<i>Cynodon dactylon</i>	Herbaceous	COLOR: Bright orange-red to yellowish orange CROWN SIZE: N/A CROWN SHAPE: N/A TEXTURE: Smooth	Abandoned agricultural fields; adjacent to wetland marsh vegetation	< .5m	Common	<i>Muhlenbergia asperifolia</i> <i>Eleocharis parishii</i> <i>Distichlis stricta</i> <i>Salsola kali</i> <i>Solanum douglassi</i>	<i>Cynodon dactylon</i> <i>Muhlenbergia asperifolia</i> / <i>Eleocharis parishii</i> <i>Salsola kali</i>	Usually indicative of wetter soils and growing conditions.

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<i>Distichlis stricta</i>	Herbaceous	COLOR: Brownish-red CROWN SIZE: N/A CROWN SHAPE: N/A TEXTURE: Slightly mottled	Transition areas between marsh and upland	< .5m	Fairly common	<i>Prosopis velutina</i> <i>Cynodon dactylon</i> <i>Muhlenbergia asperifolia</i> <i>Eleocharis parishii</i>	<i>Prosopis velutina</i> / <i>Distichlis stricta</i> <i>Muhlenbergia asperifolia</i> / <i>Eleocharis parishii</i> <i>Cynodon dactylon</i>	Indicative of saltier growing conditions; large area adjacent to southern marsh.
<i>Eleocharis parishii</i>	Herbaceous	COLOR: Pink-red CROWN SIZE: N/A CROWN SHAPE: N/A TEXTURE: Smooth	Transitional areas between wetlands and uplands	.5-1m	Common	<i>Muhlenbergia asperifolia</i> <i>Cynodon dactylon</i>	<i>Muhlenbergia asperifolia</i> / <i>Eleocharis parishii</i>	Occurs in sites which are fairly wet - usually adjacent to <i>Scirpus validus</i> or <i>Typha angustifolia</i> ; abundant in the northern portions of the study area.
<i>Eragrostis lehmanniana</i>	Herbaceous	Photo signature not conclusive	Disturbed areas	< .5m	Uncommon	<i>Aristida purpurea</i>	<i>Eragrostis lehmannians</i>	Photo signature cannot be differentiated from other dry graminoids - mapped from field verification information; restricted to very disturbed sites in upland areas - most are along roadways.
<i>Eriogonum deflexum</i>	Shrub	Photo signature not conclusive	Uplands	.5-1m	Uncommon	<i>Aristida purpurea</i> <i>Acacia greggi</i>	<i>Aristida purpurea</i> / <i>Krameria parvifolia</i>	Photo signature cannot be differentiated from surrounding dwarf shrubs and dry graminoids - mapped from field verification information.
Forbs - undifferentiated	Herbaceous	This category is used when the photo signature does not identify distinct species and field verification information is not available.	Disturbed areas	.5-1.5m	Common	<i>Salsola kali</i> <i>Solanum douglassi</i> <i>Prosopis velutina</i>	Short perennial Forb Association semi- cultivated . Sort perennial Forb Association semi-natural. Intermittently flooded cold- deciduous shrubland	Abundant in the northern portions of the study area.

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Graminoid - dry	Herbaceous	This category is used when the photo signature does not identify distinct species and field verification information is not available.	Uplands	< .5m	Abundant	<i>Larrea tridentata</i> <i>Canotia holocantha</i> <i>Prosopis velutina</i> <i>Aristida purpurea</i> <i>Krameria parvifolia</i> <i>Gutierrezia sarothrae</i>	<i>Larrea tridentata</i> / <i>Aristida purpurea</i> <i>Canotia holocantha</i> / <i>Aristida purpurea</i> <i>Prosopis velutina</i> / <i>Gutierrezia sarothrae</i> <i>Aristida purpurea</i> / <i>Krameria parvifolia</i> <i>Juniperus erythrocarpa</i> / <i>Canotia holocantha</i>	Associated with most upland communities; occurs on the bluffs and mesas as a typical sparse desert grassland; forms an understory to taller shrubs.
Graminoid - wet	Herbaceous	This category is used when the photo signature does not identify distinct species and field verification information is not available.	Wetlands	< .5-1m	Common	<i>Cynodon dactylon</i> <i>Muhlenbergia asperifolia</i> <i>Eleocharis parishii</i> <i>Distichlis stricta</i>	<i>Cynodon dactylon</i> <i>Muhlenbergia asperifolia</i> / <i>Eleocharis parishii</i> <i>Prosopis velutina</i> / <i>Distichlis stricta</i> <i>Typha angustifolia</i>	
<i>Gutierrezia sarothrae</i>	Shrub / Herbaceous	Photo signature not conclusive	Desert plains and uplands.	< .5m	Common	<i>Prosopis velutina</i> <i>Acacia gregii</i> <i>Aristida purpurea</i>	<i>Prosopis velutina</i> / <i>Gutierrezia sarothrae</i>	Photo signature cannot be differentiated from other dry graminoids - mapped from field verification information; the <i>Prosopis velutina</i> / <i>Gutierrezia sarothrae</i> alliance is indicative of past disturbance, usually due to grazing.
<i>Hordeum jubatum</i>	Herbaceous	Photo signature not conclusive	Sandy substrate, active and remnant riverine flats.	< .5m	Common	<i>Prosopis velutina</i> <i>Populus fremontii</i>	<i>Prosopis velutina</i> / <i>Hordeum jubatum</i> <i>Populus fremontii</i> / <i>Hordeum jubatum</i>	Photo signature cannot be differentiated from other dry graminoids - mapped from field verification information; common understory to the <i>Prosopis velutina</i> bosque and the <i>Populus fremontii</i> woodland.

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<i>Juniperus erythrocarpa</i>	Shrub	COLOR: Red CROWN SIZE: Large CROWN SHAPE: Round TEXTURE: Smooth	Bluffs in shaded areas; upland mesa.	1-10m	Uncommon	<i>Canotia holocantha</i> <i>Aristida purpurea</i>	<i>Juniperus erythrocarpa</i> / <i>Canotia holocantha</i>	Widespread across the mesas but sparse - groups of over 5 individuals are rare.
<i>Krameria parvifolia</i>	Shrub	Photo signature not conclusive	Dry uplands and mesas.	< .5-1m	Common	<i>Aristida purpurea</i> <i>Larrea divartica</i> <i>Canotia holocantha</i>	<i>Aristida purpurea</i> / <i>Krameria parvifolia</i> <i>Larrea divartica</i> / <i>Aristida purpurea</i> <i>Canotia holocantha</i> / <i>Aristida purpurea</i>	Typically found on ridge east of the visitors center and the mesa top in association with other dwarf shrubs and dry graminoids.
<i>Larrea divartica</i>	Shrub	COLOR: Light orange-red CROWN SIZE: Medium CROWN SHAPE: Irregular, open TEXTURE: Mottled, irregular	Exposed limestone bluffs of shallow, rapidly drained soils and mesas.	1-2m	Common	<i>Parthenium incanum</i> <i>Aristida purpurea</i> <i>Krameria parvifolia</i> <i>Canotia holocantha</i>	<i>Larrea divartica</i> / <i>Aristida purpurea</i> <i>Canotia holocantha</i> / <i>Aristida purpurea</i>	Common on bluffs in association with <i>Parthenium incanum</i> , <i>Aristida purpurea</i> and other shrub species; occurs in pure stands on the mesas.
<i>Mahonia trifoliata</i>	Shrub	COLOR: Red-orange CROWN SIZE: Medium CROWN SHAPE: Rounded TEXTURE: Smooth	Toeslopes of bluffs adjacent to or in close proximity to the marsh or major canyons.	1-3m	Fairly common	<i>Prosopis velutina</i> <i>Celtis reticulata</i> <i>Solanum douglassi</i>	<i>Prosopis velutina</i> / <i>Celtis reticulata</i>	Photo signature cannot be differentiated from <i>Prosopis velutina</i> or <i>Celtis reticulata</i> - mapped from field verification information; also an indicator species for the <i>Prosopis velutina</i> / <i>Celtis reticulata</i> alliance.
<i>Muhlenbergia asperifolia</i>	Herbaceous	COLOR: Pinkish-white CROWN SIZE: CROWN SHAPE: TEXTURE: Mottled	Transitional areas between wetlands and uplands.	.5-1m	Common	<i>Eleocharis parishii</i> <i>Cynodon dactylon</i> <i>Distichlis stricta</i>	<i>Muhlenbergia asperifolia</i> / <i>Eleocharis parishii</i>	Occurs in sites which are fairly wet - usually adjacent to <i>Scirpus validus</i> or <i>Typha angustifolia</i> ; abundant in the northern portions of the study area.

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<i>Muhlenbergia porteri</i>	Herbaceous	COLOR: Brown CROWN SIZE: Small CROWN SHAPE: Rounded TEXTURE: Mottled	North-facing slopes	1-2m	Uncommon	<i>Atriplex canescens</i> <i>Prosopis velutina</i> <i>Acacia greggii</i> <i>Aristida purpurea</i>	<i>Atriplex canescens</i> / <i>Muhlenbergia porteri</i>	Restricted to the slopes below the monument ruins - more abundant on the cooler north facing slope; prefers more mesic growing conditions, usually found growing under a shrub overstory.
<i>Parthenium incanum</i>	Shrub	COLOR: Light pink CROWN SIZE: Small CROWN SHAPE: Rounded TEXTURE: Smooth	Xeric slopes and upland areas.	< .5m	Fairly common	<i>Atriplex canescens</i> <i>Larrea divartica</i>	<i>Atriplex canescens</i> / <i>Muhlenbergia porteri</i> <i>Larrea tridentate</i> / <i>Aristida purpurea</i>	Found in dense stands below the ruins; also found in a horizontal band along the bluffs NE of the marsh.
<i>Populus fremontii</i>	Tree	COLOR: Orange-pink CROWN SIZE: Large CROWN SHAPE: Rounded TEXTURE: Mottled	Sandy substrate, active and remnant riverine flats.	15-35m	Fairly common	<i>Salix goodingii</i> <i>Prosopis velutina</i> <i>Hordeum jubatum</i>	<i>Populus fremontii</i> / <i>Salix goodingii</i> <i>Populus fremontii</i> / <i>Prosopis velutina</i> <i>Populus fremontii</i> / <i>Hordeum jubatum</i>	Usually present as individual trees or in small groups along the marsh and the Verde river.
<i>Prosopis velutina</i>	Tree / Shrub	COLOR: Red-orange CROWN SIZE: T=medium S=small CROWN SHAPE: Rounded TEXTURE: Smooth	Toeslopes of steep bluffs; desert plains; edge of riparian areas.	1-10m	Abundant	<i>Gutierrezia sarothrae</i> <i>Acacia greggii</i> <i>Celtis reticulata</i> <i>Mahonia trifoliata</i>	<i>Prosopis velutina</i> / <i>Hordeum jubatum</i> <i>Prosopis velutina</i> / <i>Celtis reticulata</i> <i>Prosopis velutina</i> / <i>Distichlis stricta</i> <i>Prosopis velutina</i> / <i>Gutierrezia sarothrae</i>	Occurs in tree form in the bosque and toeslopes; shrub form in other areas- <i>Prosopis velutina</i> / <i>Gutierrezia sarothrae</i> is an indicator of past disturbance - <i>Prosopis velutina</i> / <i>Celtis reticulata</i> is a typical ecotone between riparian and upland areas.
<i>Quercus turbinella</i>	Tree	COLOR: Red-orange CROWN SIZE: Medium CROWN SHAPE: Rounded TEXTURE: Smooth	Steep shaded bluffs in major canyons.	5-10m	Uncommon	<i>Celtis reticulata</i> <i>Canotia holocantha</i> <i>Prosopis velutina</i>	<i>Celtis reticulata</i> / <i>Quercus turbinella</i>	Photo signature cannot be differentiated from <i>Prosopis velutina</i> or <i>Celtis reticulata</i> - mapped from on-site field verification information.

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<i>Salix goodingii</i>	Tree	COLOR: Orange-pink CROWN SIZE: Medium CROWN SHAPE: Irregular TEXTURE: Mottled	Sandy substrate, active and remnant riverine flats.	5-20m	Fairly common	<i>Populus fremontii</i>	<i>Populus fremontii</i> / <i>Salix goodingii</i>	Usually present in association with <i>Populus fremontii</i> in narrow band-like units adjacent to water.
<i>Salsola kali</i>	Herbaceous	COLOR: Dark brown-brownish orange CROWN SIZE: Small CROWN SHAPE: Irregular TEXTURE: Mottled	Disturbed areas	1-2m	Common	<i>Solanum douglassii</i> <i>Cirsium</i> spp. <i>Chilopsis linearis</i>	Short Perennial Forb Association semi-cultivated Short Perennial Forb Association semi-natural Intermittently flooded cold-deciduous shrubland <i>Chilopsis linearis</i>	Common in disturbed and borderline wet sites; large concentrations are found south of the Verde river with <i>Chilopsis linearis</i> , on sandy sites north of the Verde river, and in areas by the old dairy in the northern part of the study area.
<i>Scirpus validus</i>	Herbaceous	COLOR: Red to orange-red (depends upon life cycle stage) CROWN SIZE: N/A CROWN SHAPE: N/A TEXTURE: Smooth	Wetlands	1-4m	Fairly common	<i>Typha angustifolia</i> <i>Muhlenbergia asperifolia</i> <i>Eleocharis parishii</i>	<i>Typha angustifolia</i>	Dominant/codominant vegetation type with <i>Typha angustifolia</i> in the northern part of the study area - sparse in the south.
Shrubs - undifferentiated	Shrub	This category is used when the photo signature does not identify distinct species and field verification information is not available.	Uplands	.5-2m	Abundant	<i>Larrea tridentata</i> <i>Canotia holocantha</i> <i>Prosopis velutina</i> <i>Aristida purpurea</i> <i>Krameria parvifolia</i> <i>Gutierrezia sarothrae</i>	<i>Larrea tridentate</i> / <i>Aristida purpurea</i> <i>Canotia holocantha</i> / <i>Aristida purpurea</i> <i>Prosopis velutina</i> / <i>Gutierrezia sarothrae</i> <i>Aristida purpurea</i> / <i>Krameria parvifolia</i> <i>Juniperus erythrocarpa</i> / <i>Canotia holocantha</i>	This category is used when recognized species do not form a dominant or codominant photo signature and/or there is no field verification information available; common on xeric sites throughout the monument.

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<i>Solanum douglassi</i>	Herbaceous	COLOR: Light-red CROWN SIZE: N/A CROWN SHAPE: N/A TEXTURE: Smooth	Disturbed areas	< .5m	Common	<i>Salsola kali</i> <i>Prosopis velutina</i>	Short Perennial Forb Association semi-cultivated Short Perennial Forb Association semi-natural Intermittently flooded cold-deciduous shrubland	Common in disturbed and borderline wet sites; large concentrations are found on sandy sites north of the Verde river, and in areas by the old dairy in the northern part of the study area; also forms part of the understory vegetation to <i>Prosopis velutina</i> / <i>Celtis reticulata</i> .
<i>Typha angustifolia</i>	Herbaceous	COLOR: Brilliant red-dark brown (depends upon life cycle stage) CROWN SIZE: N/A CROWN SHAPE: N/A TEXTURE: Very mottled	Wetlands	1-4m	Fairly common	<i>Scirpus validus</i> <i>Muhlenbergia asperifolia</i> <i>Eleocharis parishii</i>	<i>Typha angustifolia</i>	The dominant wetland emergent species of the marsh; commonly seen as pure stands or with <i>Scirpus validus</i> .